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Perception of prominence in Standard British English

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ABSTRACT

The perception of prominence in short English utterances was examined in a listening experiment where raters indicated prominence on a four-level scale. The results show that the first and last lexical item in an utterance are more prominent than any intervening stressed words, and that the perceived prominences follow a strong - weak alternating pattern. The traditional claim in the British school of intonation analysis that the 'nucleus' is the most prominent syllable in an utterance or intonation unit is only partially supported, and it is argued that prominence should be rejected as a defining property of the nucleus.

1 INTRODUCTION

Many descriptions of English assume the presence of an obligatory sentence accent (tonic/nucleus), which is often described or defined as 'the pitch accent which stands out as the most prominent in an intonation-group' [1:42]. This is usually the last fully stressed word in the intonation unit, unless semantic or pragmatic factors lead to a different position. In other words, in a neutral, context-free reading of an English sentence the last stressed word is expected to be the most prominent and consequently often labelled the *primary accent*. This concept of a neutral, default reading is in good agreement with Ladd's notion of 'broad focus on the whole sentence' [2:164]. Danish differs from English in the absence of any obligatory nucleus or primary accent. In neutral utterances all stressed words are equally prominent [3, 4].

The investigation presented here is part of a larger project on the manifestation of stress in Southern Standard British English utterances, including a comparison with Danish. A series of shorter English sentences had been recorded by six speakers in a neutral, context-free version and in versions with variation in the location of the pragmatic focus. However, the predicted difference between Danish and English neutral readings was not evident to me in most of the recorded utterances; the final nucleus did not stand out as more prominent in all cases. The prominence level of all words in these utterances was therefore examined in a listening experiment.

2 METHOD

The test material contained both neutral utterances and utterances with a specific pragmatic focus, but only the material concerning neutral utterances is treated here. The material consisted of 10 sentences spoken by six speakers of Southern Standard British English, i.e. 60 utterances in total. The sentences were:

Abbr.	*Sentence*
ps	Paul sings.
bsa	Bill struck Ann.
jkft	Jane kissed Frank tenderly.
pc	The party was cancelled.
css	The cook was smelling the soup.
sepc	Sheila examined the patient carefully.
tgios	The Germans' import of sinks from Denmark [...]
gitsd	The Germans import their sinks from Denmark.
pdp	Is Peter a doctor in Paris?
dsi	Did Stalin insist on an equal distribution of wealth?

(All sentences will be identified by their abbreviation in the rest of the paper.)

The results for one speaker had to be excluded entirely because her production of neutral utterances deviated strongly from the other speakers (heard as strong emphasis on the first lexical item). Six other utterances by various speakers had to be excluded from analysis since they deviated too much from the other utterances to allow grouping of results. This leaves a total of 44 utterances for further analysis.

The utterances were organised in a randomised list and presented from a web page. There were ten Danish and six English raters, all professional phoneticians or graduate students in phonetics. They could listen to the utterances as many times as they wanted and were asked to indicate stress according to the following scale, which was subsequently coded numerically as shown:

Label	*Coded as*
(extra) strong stress	3
(normal) full stress	2
weaker/reduced stress	1
no stress	0

The 'no stress' category was not marked explicitly, but any word which was not marked for stress was implicitly assumed to be deemed unstressed.

3 RESULTS

3.1 RELIABILITY AND AGREEMENT

Each individual word in the 44 utterances, 226 in total, was treated as an independent object and a rater score for a word was considered to be one observation.

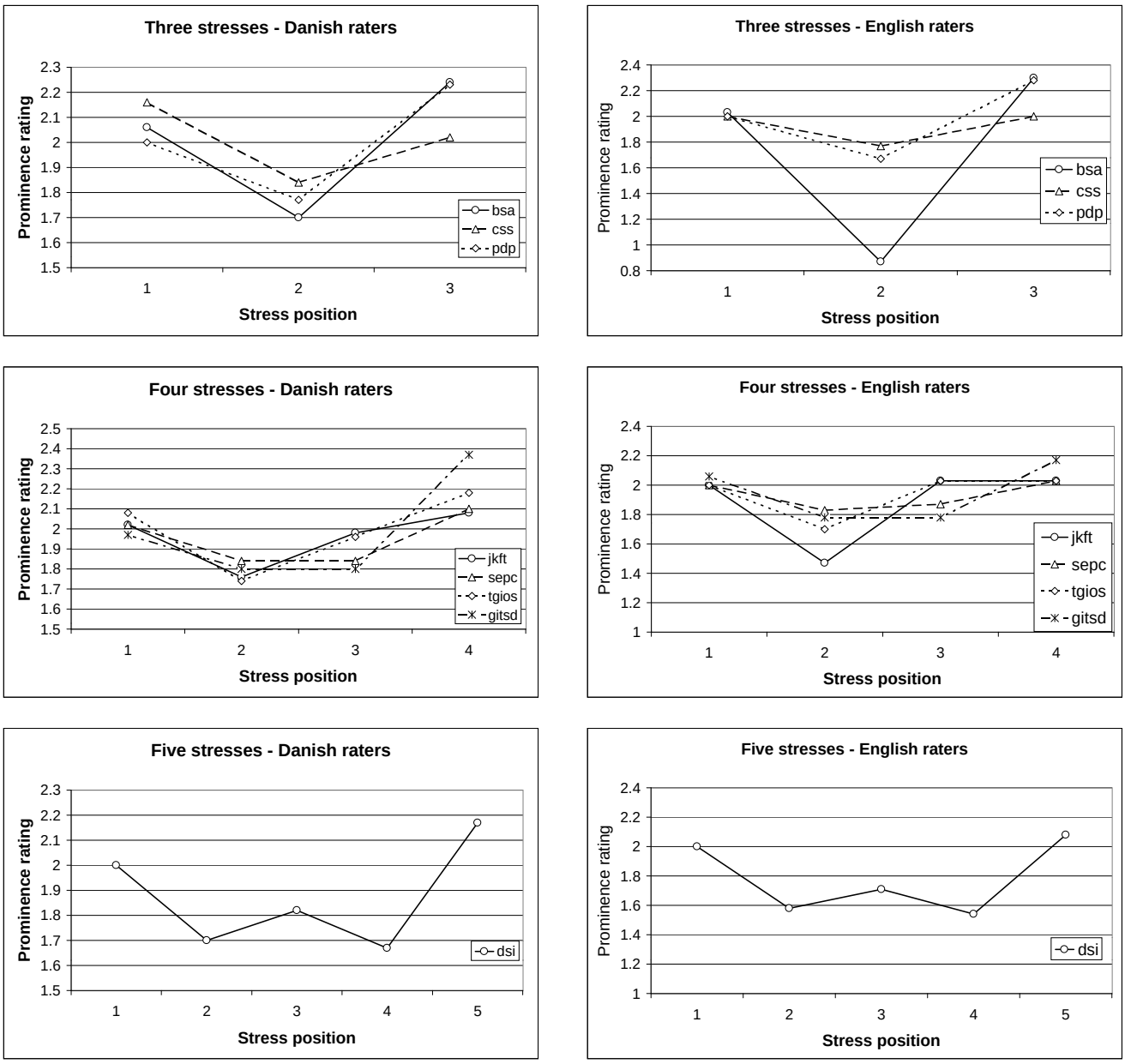

Figure 1: Prominence ratings by ten Danish and six English raters. Labels refer to the sentence abbreviations.

I tested interrater reliability using the procedure in [5] to estimate Cronbach's α, and used a comparison between all possible rater pairs for each word as an expression of agreement, i.e. all 45 combinations of the ten Danish raters and 15 combinations of the six English raters. Interrater reliability and agreement were good for both groups of raters:

	Danish	English
Reliability: Cronbach's α	0.988	0.968
Pairwise agreement	80.4%	82.6%

Table 1: Interrater reliability and agreement, the latter expressed as the percentage of rater pairs who agree about each individual word (averaged over all 226 words).

The grammatical words in the sentences were deemed to be completely unstressed by all raters in almost all cases. Therefore, only scores for the lexical words are reported below. Average scores for both groups of raters were calculated for all words. Furthermore, tokens of the same sentence read by different speakers were grouped, so that the results for e.g. the sentence 'Paul sings' were calculated by averaging the scores of all raters in a group across all speakers.

3.2 PROMINENCE RATINGS

Figure 1 depicts the prominence ratings from sentences with three, four and five lexical items respectively. The sentences with only two lexical items are omitted since they do not contribute additional information. All scores

are averages across three to five speakers and ten Danish and six English raters.

Two trends appear from Figure 1: 1) the prominence on consecutive lexical items seems to follow a strong - weak alternating pattern. 2) the first and last lexical items in each sentence are generally deemed to be the most prominent words, while intermediate items are somewhat less prominent.

3.3 STRONG - WEAK ALTERNATION

I would like to point out that I consider all the lexical items in these sentences to be stressed. With one possible exception they all received prominence ratings closer to 'normal, full stress' than to 'unstressed', and in most cases also closer to normal, full stress than to 'weaker/reduced stress'. So the strong - weak alternation in this material is not a question of complete deaccentuation but operates, in my opinion, *within* the category of normal stress in the utterance.

In sentences with three lexical items there is a clear reduction in prominence level on the middle one, which is significantly less prominent than both the first and last items for both rater groups ($p < 0.05$, two-tailed t-test). There is one noticeable difference between rater groups: prominence on the second lexical item of sentence *bsa* was rated much lower by the English than by the Danish raters. This difference is also found, to a lesser degree, on the second lexical item of the sentence *jkft*. It is worth noting that both these sentences exhibit stress clash. It would seem, then, that the weakening effect is strongest when there are no unstressed syllables between the stressed ones. This is not surprising considering that the rule for lexical stress in English prohibits stress on two consecutive syllables (stress clash) within the same morpheme. Looking at the individual utterances and raters these differences seem to be caused mainly by the fact that those Danish raters who deemed these words to be reduced from fully stressed heard them as having 'weaker stress' = '1', whereas the English raters heard 'no stress' = '0'. There were also raters in both groups who judged these words to be fully stressed.

In sentences with five lexical items the first and the last item are again clearly deemed the most prominent. The differences between those and either of the intermediate items are significant ($p < 0.05$), while the differences between the third lexical item and the surrounding slightly more prominent items are not significant, but at least show a tendency towards strong - weak alternation.

In sentences with four lexical items the picture is less clear. Again the first and last items are deemed most prominent, and there is a clear drop in prominence level from number one to number two (significant for all sentences except *gitsd*). But the prominence level of the third item varies; in sentences *sepc* and *gitsd* it is as low as number two (and significantly different from the following, final item) and in *jkft* and *tgios* it is as high (English raters) as the last item or almost as high (Danish raters, the difference is significant).

These observations lead to the following hypothesis: the first and last lexical items in a (monophrasal) utterance are always the most prominent, and the prominence levels generally follow a strong - weak alternating pattern from left to right. With an equal number of lexical items in the phrase the penultimate item is in a position of conflict: it should be strong in relation to the preceding item but weak in relation to the following, final item. In this case there seems to be a choice for the speaker to make it either weak(er) or strong(er).

My material is not comprehensive enough to test this hypothesis, but it warrants further investigation.

3.4 FIRST AND LAST LEXICAL ITEM

The perceived difference in prominence level between the first and last lexical items and the intermediate ones was shown above to be significant in almost all cases; the two peripheral items are in general the most prominent. This is in good agreement with the status of initial and final position in some descriptions of British English intonation, namely as 'onset' and 'nucleus', respectively. While the nucleus is (normally) found on the final lexical item in monophrasal utterances, the onset is the first (fully) stressed word [1]. However, these accounts also predict a difference in prominence level between the two and state that the nucleus carries a *primary accent* while the onset carries a *secondary accent*. It does appear from the results in Figure 1 that such a tendency exists, but it is in no way as clear as could be expected from the definition of the nucleus as the most prominent syllable in the utterance. The differences in prominence between the first and last lexical items are presented in Table 1 (including the utterances with two lexical items).

	Danish raters			English raters		
Sent	*Diff*	*N*	*p*	*Diff*	*N*	*p*
ps	0.00	50	1.000	0.03	30	0.745
bsa	0.18	50	**0.028**	0.27	30	**0.043**
jkft	0.06	50	0.261	0.03	30	0.573
pc	0.15	40	0.057	0.08	24	0.328
css	-0.14	50	0.007	0.00	30	1.000
sepc	0.08	50	0.159	0.03	30	0.326
tgios	0.10	50	0.200	0.03	30	0.662
gitsd	0.40	30	**0.000**	0.11	18	0.430
pdp	0.23	30	**0.006**	0.28	18	0.096
dsi	0.17	40	**0.033**	0.08	24	0.328
All	0.10	440	**0.000**	0.08	264	**0.006**

p = two-tailed probability, paired t-test
Significant values ($p < 0.05$) are in bold-face type.

Table 2: Differences in prominence ratings between last lexical item and first lexical item (i.e. last – first) in neutral utterances.

The overall difference between the two positions is highly significant in both rater groups ($p < 0.01$), but it is very small: only 0.10 on the scale from 0 to 3 for the Danish raters and 0.08 for the English raters. The scores for individual sentences vary between a negative difference of 0.14 in sentence *css*, i.e. the first lexical item was deemed more prominent than the last one, to a difference of 0.40 in sentence *gitsd* (Danish raters), with a slightly smaller range of variation in the English rater group. In almost half the sentences the difference is 0.10 or less, which is an indication that the difference may be present in an utterance but does not have to be. Figure 2 presents the differences in perceived prominence on the last and and first stressed items in the 44 utterances, English and Danish separately.

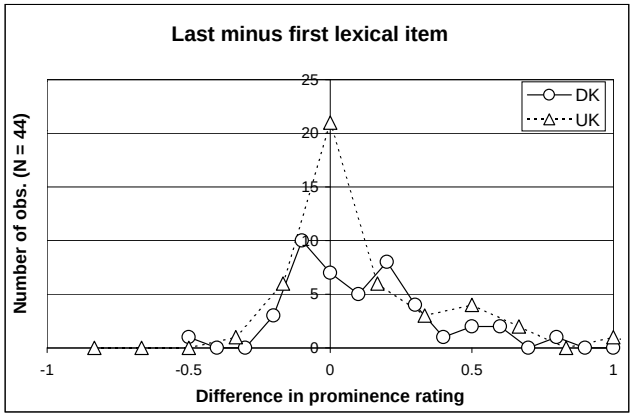

Figure 2: Differences in prominence ratings between the last and first lexical item in 44 neutral utterances.

The differences are centered fairly evenly around '0', i.e. no difference, but with a slight asymmetry in the tails of the distribution. The difference exceeds 0.2 in favour of the last item more often than it does in favour of the first item, but still in only 20% of the utterances. We are left to conclude that the first and last lexical item do not necessarily differ in perceived prominence.

These data show that it cannot be taken for granted that the final lexical item in a neutral utterance will be the most prominent word. In around 80% of the utterances in my material there was no discernible difference between the first and last lexical item, and the small differences could go in either direction, and there are even examples (see sentences *jkft* and *tgios*, English raters) where the penultimate item was deemed to be as prominent as the last one. If the last lexical item is synonymous with the nucleus in the traditional British descriptions it therefore seems that it should not be defined or described as the most prominent word in the utterance (strictly speaking the *intonation unit*).

In a separate experiment (to be reported later in more detail) a group of four English phoneticians identified onsets and nuclei explicitly according to the principles of the British English school of intonation analysis, as outlined in [1]. I selected the 39 cases where at least three of the four raters agreed on this identification, and calculated prominence ratings for these words by the Danish and English raters:

	Danish	*English*
Onset	2.02	2.00
Nucleus	2.14	2.07
Difference	0.12	0.07
p, paired t-test	0.000	0.015

Table 3: Prominence ratings of onsets and nuclei.

These prominence ratings are very similar to the overall ratings for first and last lexical item (Table 1) and the distribution of differences between nuclei and onsets, depicted in Figure 3, is similar to the one in Figure 2:

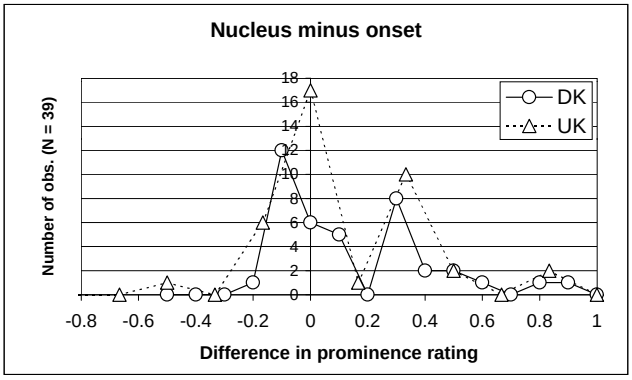

Figure 3: Distribution of differences between nucleus and onset for 10 Danish and six English raters. The onsets and nuclei were identified in a separate experiment.

Figure 3 also shows that the onset was sometimes deemed (slightly) more prominent than the nucleus. Being the most prominent word in the utterance is therefore neither a necessary nor sufficient condition for a nucleus, and if one wishes to maintain that the nucleus is an obligatory part of all intonation units, and therefore of all utterances, it should be defined without reference to prominence.

REFERENCES

[1] A. Cruttenden, *Intonation*, Cambridge: Cambridge University Press, 2nd edition, 1997.

[2] D. R. Ladd, *Intonational phonology*, Cambridge: Cambridge University Press, 1996.

[3] N. Grønnum, *The groundworks of Danish intonation*, Copenhagen: Museum Tusculanum Press, 1992.

[4] N. Grønnum, 'Intonation in Danish,' in *Intonation systems. A survey of twenty languages*, D. Hirst and A. Di Cristo, Ed., pp. 131-151. Cambridge University Press, 1998.

[5] T. Rietveld and R. van Hout, *Statistical techniques for the study of language and language behaviour*, Berlin: Mouton de Gruyter, 1993.